



# Goddard Space Flight Center 2009 Sample Student Projects

<b>Required Academic Level</b>	<b>Category</b>
Freshman/Sophomore Undergraduate, Junior/Senior Undergraduate Graduate/Masters, Graduate/Doctorate	<i>Earth Sci</i>
	<b>Subcategory</b>
	<i>Regional and Global Modeling</i>

## Project Title

***Evaluating the Impacts of Irrigation on Coupled Regional Model Simulations of Land-Atmosphere Water & Energy Fluxes & States.***

## Project Description

Researchers at the NASA Goddard Space Flight Center have developed a high resolution land surface modeling and data assimilation system known as the Land Information System (LIS), which provides an infrastructure to integrate state-of-the-art land surface models, data assimilation algorithms, observations of land surface from satellite and remotely sensed platforms to provide estimates of land surface conditions such as soil moisture, evaporation, snowpack and runoff. LIS has been coupled to the Weather Research and Forecasting (WRF) regional model, to provide flexible and high-resolution land boundary conditions and fluxes for 3D atmospheric simulations. LIS-WRF is currently used to evaluate the sensitivity of ambient weather, PBL evolution, clouds, and precipitation to the various land surface schemes and physical specifications inherent in LIS. The primary goal of this project is to evaluate the impact of including an irrigation scheme in LIS on the coupled (LIS-WRF) simulations of water and energy fluxes and states. Irrigation modules have already been tested offline in the Noah land surface model with promising results. Therefore, the tasks at hand would include one or all of the following: a) implementing the existing irrigation scheme in LIS-WRF for Noah, b) running/evaluating simulations with and without irrigation to see the impact on the coupled model (i.e. validation exercise), and c) from a more scientific perspective help to design/evaluate irrigation in the other land surface models of LIS. All of the above activities would require and result in learning about land surface and atmospheric model physics, irrigation parameterizations, and mesoscale modeling.

## Mentor's Expectation of Student

A reasonable proficiency with FORTRAN language and Unix environment is desirable, and experience or interest in Earth System Science (atmospheric/hydrologic) modeling and prediction is desirable, though not required. The intern would be expected to gain significant skills in these areas during the directed research activities over the summer, but also should be motivated in these study areas such that they will have the opportunity to develop independent research goals pertaining to this work. A continuing collaboration with the intern and their institution regarding coupled irrigation modeling would also be looked upon favorably.

## Discipline of Project and/or Background Needed to successfully complete the project

Atmospheric Science; Enviro Science; Meteorology; Statistics; Earth Science; Hydrology, Calculus; Physics

## Skills

Linux/Unix, Windows, Excel, Word, Powerpoint, FORTRAN, Computer Modeling/Simulation